

CLAIMS :

1. A gas turbine installation comprising a compressor which compresses air, a combustor which combusts the compressed air by the compressor and fuel, a turbine which is driven by combustion gas produced in the combustor, a regenerative heat exchanger which performs heat exchange between exhaust gas exhausted from the turbine and at least a part of the compressed air supplied to the combustor and a water spraying device which supplies water into intake air to the compressor or into the compressed air compressed by the compressor, characterized in that the regenerative heat exchanger is constituted by connecting in series a plurality of heat exchangers having different heat transfer surface configurations.

2. A gas turbine installation comprising a compressor which compresses air, a combustor which combusts the compressed air by the compressor and fuel, a turbine which is driven by combustion gas produced in the combustor, a regenerative heat exchanger which performs heat exchange between exhaust gas exhausted from the turbine and at least a part of the compressed air supplied to the combustor and a water spraying device which sprays water into intake air to the

compressor or into the compressed air compressed by the compressor, characterized in that the regenerative heat exchanger is constituted by dividing into upstream side unit and downstream side unit with reference to flow direction of the compressed air, and the flow passage cross sectional area of the downstream side unit is formed small with respect to that of the upstream side unit.

3. A gas turbine installation comprising a compressor which compresses air, a combustor which combusts the compressed air by the compressor and fuel, a turbine which is driven by combustion gas produced in the combustor, a regenerative heat exchanger which performs heat exchange between exhaust gas exhausted from the turbine and at least a part of the compressed air supplied to the combustor and a water spraying device which sprays water into intake air to the compressor or into the compressed air compressed by the compressor, characterized in that the regenerative heat exchanger includes a first heat exchanger which performs heat exchange between air containing moisture content supplied by the water spraying device and the exhaust gas exhausted from the turbine and a second heat exchanger which performs heat exchange between the compressed air in which moisture content has been evaporated through the heat

exchange with the exhaust gas by the first heat exchanger and the exhaust gas exhausted by the gas turbine.

5 4. A gas turbine installation comprising a compressor which compresses air, a combustor which combusts the compressed air by the compressor and fuel, a turbine which is driven by combustion gas produced in the combustor, a regenerative heat exchanger which
10 performs heat exchange between exhaust gas exhausted from the turbine and at least a part of the compressed air supplied to the combustor and a water spraying device which sprays water into intake air to the compressor or into the compressed air compressed by
15 the compressor, characterized in that the regenerative heat exchanger is constituted in such a manner that the flow passage for passing the compressed air is formed narrower in the direction from the upstream side to the downstream side thereof.

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5. A gas turbine installation comprising a compressor which compresses air, a combustor which combusts the compressed air by the compressor and fuel, a turbine which is driven by combustion gas produced in the combustor, a first water spraying device which is
25 arranged at the upstream side of the compressor and adds water to the intake air of the compressor, a first

regenerative heat exchanger which performs heat exchange between exhaust gas exhausted from the turbine and at least a part of the compressed air supplied to the combustor, a second water spraying device which adds water in an amount corresponding to the amount which will be evaporated before the compressed air is supplied to the first regenerative heat exchanger into the compressed air compressed by the compressor, a third water spraying device which adds water into the compressed air heated by the first generating heat exchanger, and a second regenerative heat exchanger which performs heat exchange between the air containing moisture content supplied by the third water spraying device and the exhaust gas from the turbine.

6. A gas turbine installation of any one of claims 1 through 5, wherein at least a part of the regenerative heat exchanger is constituted by gathering a plurality of block shaped modules.

7. A gas turbine installation of any one of claims 1 through 5, wherein a part of the regenerative heat exchanger is constituted by a pipe shaped heat exchanger and at the midway of the pipe a water discharge use drain is provided.

8. A gas turbine installation of any one of claims 1 through 4, wherein the water spraying device includes a first water spraying device which adds water into intake air of the compressor at the upstream of the compressor, a second water spraying device which adds water to the compressed air to be supplied to the regenerative heat exchanger at or near the outlet of the compressor and a third water spraying device which adds water to the compressed air to be supplied to the regenerative heat exchanger at or near the inlet of the regenerative heat exchanger.

9. A gas turbine installation of any one of claims 1 through 5, wherein a part of passage which introduces the compressed air to the regenerative heat exchanger is arranged so as to pass a region having temperature higher than the temperature of the compressed air flowing through the passage.

10. A gas turbine installation of claim 6, wherein in a flow passage which supplies the air compressed by the compressor to the regenerative heat exchanger a structural body which accelerates evaporation of water droplets added by the water spraying device is provided.

11. A method of operating a gas turbine installation

which includes a compressor which compresses air, a combustor which combusts the compressed air by the compressor and fuel, a turbine which is driven by combustion gas produced in the combustor, a
5 regenerative heat exchanger which performs heat exchange between exhaust gas exhausted from the turbine and at least a part of the compressed air supplied to the combustor and a water spraying device which sprays water into intake air to the compressor
10 or into the compressed air compressed by the compressor, characterized in that the operating method comprises the steps of;

performing heat exchange with the regenerative heat exchanger between the air containing moisture
15 content supplied by the water spraying device and the exhaust gas exhausted by the gas turbine to evaporate moisture content in the compressed air; and

further performing heat exchange between the compressed air in which moisture content has been
20 evaporated and the exhaust gas exhausted from the gas turbine.